

## ESTIMATING THE LEVEL OF D-DIMER AND FERRITIN IN THE SERUM OF SEVER AND MILD COVID-19 PATIENTS AT SUMER UNIVERSITY\FACULTY OF SCIENCES IN DHI-QAR GOVERNORATE

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### ABSTRACT

*Introduction: High morbidity and death are linked to the new coronavirus, SARS-CoV-2, particularly in those with underlying medical problems. A new enclosed RNA virus called COVID-19 is the infectious disease that causes severe pneumonia. D-dimer and ferritin play an important role in inflammation and infectious diseases. Objective of this study: the current article was planned to determine the correlation between sever COVID-19 and levels of D-dimer and ferritin. Method: A total of 100 Iraqi patients with COVID-19 recruited between 1 February 2021 and 12 December 2021 were analyzed in this study, clinical characteristics, nasopharyngeal swab samples, and IgG and IgM antibody tests were used to make the diagnosis of the patients. They were divided in to two groups the first group was sever patients which consisted of 58 patients, the second group was consisted of 42 patients. These samples were collected from the students and members of Faculty of Science Sumer University at Thi – Qar province. Their ages were ranged from 19 to 55 years. The majority of the patients were men. Results: The results of the current study indicated a higher percentage of both D-dimer and ferritin in the sever patients' samples than in the mild patients' samples. Conclusions: Since the levels of both D-dimer and ferritin were high in sever patients' individuals it will be easier to deploy scarce resources and generate more accurate forecasts about the course of disease if D-dimer and ferritin trajectory patterns are understood and applied. Serum ferritin and D-dimer assays spaced out across time can help identify individuals who are at high risk of developing Cytokine storm syndrome and will need intensive care services. For patients with steady or declining serum ferritin and D-dimer trajectories, cytokine trajectory-based therapy can be administered safely at home, in primary care settings, or in temporary COVID-19 facilities without requiring transfer to a tertiary care facility.*

### INTRODUCTION

In the finale of 2019 cleared the starting of a hard date for world, the COVID-19 Pandemic first described in China, Hubei, Wuhan, which placed the health system in all around the world. A new coronavirus, severe acute respiratory syndrome coronavirus-2(SARS-CoV-2), has spread widely, [1, 2]. COVID-19 has established a varied range of clinical appearances, from paucisymptomatic forms or asymptomatic, to viral pneumonia with failure in respiratory system, septic shock , systemic dysfunctions in terms of sepsis and multiorgan , and death[3, 4].

D –dimer is a analysis product of solvable protein called fibrin produced after fibrin clot cleavages by plasmin [5] . Presently, detection levels of d-dimer is normally used to observe thrombosis and

anomalies coagulation, it very beneficial in the assessment of thromboembolism in vein , checking of anticoagulant treatment and spread intravascular coagulation [5, 6]. Considerably, D-dimer levels are indeed greater between patients of risk group to the problems of COVID-19 such as, diabetic, seniors ,current smoking and hypertensive[7]. At the time of pandemic COVID-19, one of the main trials opposite health organizations universal is the lack of hospital cots for all patients. Therefore, observing levels of D-dimer develops as key in the cataloguing of COVID-19 severity, being talented to trail the development of the disease as well as the success of the management employed. So, examining of the D-dimer possibly will be a beneficial laboratory factor to evade problems, guide therapeutic processes and decrease the quantity of intensive care unit hospitalizations as this biomarker is related to primary identification of severe cases[8]. Elevation of D-dimer levels are public in patients individuals with a number of inflammatory and infectious diseases[9].

The main function of serum ferritin, an iron-storing protein, is to control the metabolism of cellular oxygen. The two subunits that make up ferritin are H and L. According to earlier research, H-ferritin has both proinflammatory and immunosuppressive properties as an immune modulatory molecule. Elevated ferritin levels may indicate a severe inflammatory response associated with the introduction of a virus into the human body and its effect on iron metabolism [10].

The aims of the present study were to evaluate the levels of D-dimer and ferritin in the serum of Covid-19 sever patients in the study sample and compare it to their levels in the mild patient's group and its impact on the condition of patients infected with the virus.

## METHODOLOGY

### Study Setting

Before data collection, the research obtained the required approvals and formal administrative permission. Official permission was obtained from the Deanship of the Faculty of Science, Sumer University / Department of Pathological Analysis. Obtaining formal consent was a prerequisite for enrolling all study participants. Each participant participating in this study underwent a questionnaire, underwent a comprehensive clinical examination, and underwent laboratory tests mentioned in the study.

### Study Individuals:

One hundred serum samples were collected along 9 months from students and members of the Faculty of Science at Sumer University (females and males), whose ages ranged between 19 to 55 years, and who were confirmed to be infected with Covid-19. Tests were performed D-dimer and ferritin in the two groups above. D-dimer test was performed according to the manufacture company Human D-DIMER ELISA Kit Catalog Number EHDDIMER (96 tests), EHDDIMERX10 (10 x 96 tests) Rev. 7. While the test of ferritin performed according to Bartovation manufacturer (50.00) test strip. Also, we used rapid test kit for IgG and IgM to estimate whether the individuals were having COVID -19 virus in addition to other tests such as nasopharyngeal swab samples.

### Research Ethics:

Oral agreement was taken from each individual in the study before conducting the questionnaire, drawing samples and conducting tests. It was emphasized in the questionnaire that they had whole choice not to contribute at any time they wanted. This way ensures esteem for the privileges of members through observance to professional and ethical standards.

## Statistical analysis:

Data in the present study were analyzed by using chi-square test and t-test at 0.05 probability level.

## RESULTS AND DISCUSSION

### Distribution of the all studied groups (sever patients and mild patients) according to the age

A total of 100 COVID-19 patients' cases had their data examined. The study's sample population had a median age 35 years. Table 1 showed the value numbers of the two groups, sever patients and mild by age group, were the results showed that the highest percentage of patients in the age group (>40years) and lowest group the age group (19-29). There is no significant difference between two groups ( $p > 0.05$ ) as in Table1.

**Table-1.** Distribution of the all studied groups (sever patients and mild patients) according to age

Age groups by years		Sever group	Mild group
(19-29)		(3)	(9)
(30-40)		(15)	(13)
>40		(40)	(20)
P-value	Df	Chi-Square Value	
0.95	99	0.018	

**P-value: probability value**

### Distribution of patients group according to sex

This study included data from 74 males and 26 females were used to analyze the results. The results of the current study showed an increase in the rate of male's patients by a percentage of (74 %), while the rate of females was (26%), there were significant difference between males and females' patients ( $P > 0.05$ ) as seem in table 2.

**Table 2.** Distribution of COVID-19 patients group according to sex

Sex	Percentage	Chi-Square
Male	74%	4.68
Female	26%	
P-value=0.06		

### Serum level of D -dimer in sever patients and mild patients COVID-19

The laboratory results showed high levels of D-dimer where the result of it in sever patients' group was (385 ng/mL.) when compared with mild patients' group (225 ng/mL). The result was significant as p-value was 0.000 s, see Table 3.

**Table 3:** Serum level of D -dimer in sever patients and mild patients COVID-19

Parameter	Subject	No of cases	Mean	Df	T-value	P-value
D -dimer	Mild patients	42	225 ng/mL	99	4.1	0.000 s
	Sever patients	58	385 ng/mL.		7	

## Df: Degree Freedom

### Serum level of Ferritin concentration in sever patients and mild patients COVID-19

The laboratory results showed high levels of Ferritin where the result of it in sever patients' group was (401  $\mu\text{g/L}$ ) when compared with mild patients' group (221  $\mu\text{g/L}$ ). The result was significant as p-value was 0.000 s, see Table-4.

**Table 4:** Serum level of Ferritin concentration in sever patients and mild patients COVID-19

Parameter	Subject	No of cases	Mean	Df	T value	P-value
Ferritin	Mild patients	42	221 $\mu\text{g/L}$	99	4.17	0.000 s
	Sever patients	58	401 $\mu\text{g/L}$			

#### $\mu\text{g/L}$ : Microgram\ Liter

According to the results obtained in the current study, which indicate that the majority of patients with severe cases infected with the virus are from the age group older than 40 years. The reason for this is that people of this age have lower immunity compared to the other members of the study sample who are younger. Also, one of the statistical results obtained is that the group most infected with the virus are males. The reason for this is the possibility that the males in the study sample are smokers. D-dimer levels rise as a result of processes involving the synthesis and degradation of fibrin[11]. Raised D dimer levels have been linked to acute respiratory in COVID-19 cases, with a higher risk of micro pulmonary embolism, particularly in severe cases[12]. D-dimer concentrations have been documented to differ based on the clot burden, date of assessment, and start of management among patients with established thromboembolism in vein[13]. D-dimer concentrations may also rise as a result of a number of possible risk factors that may arise during hospitalization, including central venous catheter use, infection, dehydration, extended immobility, mechanical ventilation, and disseminated intravascular coagulation [14].

Based on the result we obtained, which indicates high levels of D-dimer in patients, there are many studies that agree with our result as [15], the researchers indicated that there is a close relationship between Covid-19 patients in Bangladeshi and high levels of D-dimer .Other study [16] denoted to assessed the levels of D-dimer in serum. Furthermore, a correlation between D-dimer levels and the severity of the disease was reported by [17]. On the other hand, patients exhibiting symptoms of dysgeusia had higher levels. Elevated D-dimer levels in individuals exhibiting symptoms of dysgeusia may be linked to microvascular thrombosis, which can be seen in highly vascularized tongue taste buds. The other result of this study was high level of Ferritin. It is a type of protein which storage iron that controls metabolism of oxygen in cell. Previous research, showed H-ferritin play role as an immune modulatory through immunosuppressive activities and pro-inflammatory. Our result agree with study [18] when the researchers indicated higher levels of ferritin in the COVID-19 patient group. Also our result agree with [19] who concluded that Ferritin test could predict the falling of COVID-19 patients.

## CONCLUSION

Since the levels of both ferritin and D-dimer were high in patients' individuals it will be easier to deploy scarce resources and generate more accurate forecasts about the course of disease if ferritin and D-dimer trajectory patterns are understood and applied. Serum ferritin and D-dimer assays spaced out across time can help identify individuals who are at high risk of developing Cytokine storm syndrome and will need intensive care services. For patients with steady or declining serum ferritin and D-dimer trajectories, cytokine trajectory-based therapy can be administered safely at home, in primary care settings, or in temporary COVID-19 facilities without requiring transfer to a tertiary care facility.

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## Conflict of Interest

The authors declare that they have no conflict of interest

## Supplementary material

All data generated or analyzed during this study are included in this published article.

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## Risk bias

The results showed that there was no risk of bias in this study.

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